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FRINK, JOHN MOORE	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

H

Office Action Summary	Application No.	Applicant(s)
	10/652,255	BASU ET AL.
	Examiner	Art Unit
	John M. Frink	2142

-- *The MAILING DATE of this communication appears on the cover sheet with the correspondence address* --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 21 September 2007.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-55 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-55 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. Claims 1 – 7, 9 - 18, 21 – 28, 30 – 33 and 35 – 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over as being unpatentable over Garg et al. (Improved Approximation Algorithms for Biconnected Subgraphs via Better Lower Bounding Techniques), hereafter Garg, in view of Li et al. (Sending Messages to Mobile Users in Disconnected Ad-hoc Wireless Networks), hereafter Li, and further in view Templin (US 2001/0040895 A1).

2. Regarding claim 1, Garg shows method for achieving biconnectivity in a network that includes a plurality of nodes, the method comprising: forming blocks from groups of one or more of the nodes in the network; selecting one of the blocks as a root block; identifying other ones of the blocks as leaf blocks; and modifying the edges to make the network biconnected (3.1, 4.1, 4.4).

Garg does not show collectivey moving the nodes in one or more of the leaf blocks to make the network biconnected.

Li shows moving nodes in an ad-hoc (MANET) environment in order to improve network communication, where the nodes are autonomous or semi-autonomous robotic nodes (Sections 1, 5), and further where when nodes maintain their neighbors, calculations are simplified (Section 5.1).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the disclosure of Garg with that of Li in order to provide for a method for the semi-autonomous robotic nodes of Li's disclosure to efficiently orient and

network themselves in a biconnected network, which, due to the lack of cutvertices, provides a reliable network configuration (an inherent property of biconnected networks, Mount, pg. 1).

Garg in view of Li do not show where the node movements are done collectively in blocks.

Templin shows where node movement should be minimized, as it results in increased transmissions and can temporarily diminish network performance ([0039]).

It would have been obvious to further modify disclosure of Grag in view of Li with that of Templin, and thus move nodes in collective group block movements, in order to minimize overall node movement and maintain nodes neighbors to the greatest extent possible, thus decreasing transmission costs and improving network performance (Templin [0039]).

3. Regarding claim 2, Garg in view of Li and Templin further show wherein the forming blocks includes: generating a graph of a current view of a topology of the network (Li, Sections 5, 5.1), and generating a block tree based on the current view of the topology of the network, the block tree organizing the nodes into one or more blocks (Garg, 3.1.1, 4.4).

4. Regarding claims 3, Garg in view of Li and Templin further show where the generating a graph includes: determining locations of the nodes in the network, and determining the current view of the topology of the network based on the locations of the nodes in the network (Li, Sections 5, 5.1).

5. Regarding claim 4, Garg in view of Li and Templin further show where the determining locations of the nodes includes: periodically receiving updates from the nodes, each of the updates includes a location of a corresponding one of the nodes. (Li, Sections 5, 5.1).

6. Regarding claim 5, Garg in view of Li and Templin further show where the determining locations of the nodes further includes: extracting neighbor information from the updates (Li, Section 5, where Li discloses that if you directly receive an update from a node, it is a neighbor).

7. Regarding claim 6, Garg in view of Li and Templin further show identifying cutvertices in the network (Garg, 3.1.1).

8. Regarding claim 7, Garg in view of Li and Templin further show where the collectively moving one or more (Li, Section 1, where nodes are moved to improve network performance) of the leaf blocks includes: moving one or more of the leaf blocks to remove one or more of the cutvertices from the network (Garg, 3.1.1, 3.1.2, 4.4).

9. Regarding claim 9, the collectively moving the nodes in one or more of the leaf blocks includes: moving all of the nodes within one of the leaf blocks collectively when the leaf block is moved (Li, where the leaf blocks are moved collectively to minimize messaging and transmissions costs Templin, [0039], and further where the collective movement inherently results in not changing the connectivity within the leaf block) and to simplify calculations by maintaining nodes neighbors to the greatest extent possible (Li Section 5.1)).

10. Regarding claim 10, Garg in view of Li and Templin further show where the one or more of the leaf blocks are moved while minimizing a total distance moved by all of the nodes in the network (where Templin ([0039] shows minimizing node movement along with Li (Section 1)).

11. Regarding claim 11, Garg in view of Li and Templin further show where the collectively moving the one or more nodes in of the leaf blocks includes: moving one or more of the leaf blocks, as a particular leaf block, towards a nearest node in another one of the blocks (in order to create the biconnected network disclosed by Garg (3.1 – 3.1.2, 4.4) utilizing Templin's ([0039]) and Li's (Section 5.1) disclosures of minimizing node movement and keeping the changes of nodes neighbors minimized).

12. Regarding claim 12, Garg in view of Li and Templin further show where the particular leaf block is moved towards the nearest node until at least one new edge appears between the particular leaf block and the other one of the blocks (in order to create the biconnected network by creating/drawing edges disclosed by Garg (3.1 – 3.1.2, 4.4) utilizing Templin's ([0039]) and Li's (Section 5.1) disclosures of minimizing node movement and keeping the changes of nodes neighbors minimized).

13. Regarding claim 13, Garg in view of Li and Templin further show wherein the collectively moving (Li, Section 1, and Templin, [0039]) the nodes in one or more of the leaf blocks is performed iteratively (Garg, 3.1.1 and 3.1.2) until the network is biconnected (Garg, 1, 3.1.1).

14. Regarding claim 14, Garg in view of Li and Templin further show where the collectively moving the nodes in of one or more of the leaf blocks is performed after final

positions for the one or more of the leaf blocks is determined (where Li discloses that maintaining the network structure simplifies calculations, Section 5.1).

15. Regarding claims 15 and 16, Garg in view of Li and Templin further show where the method is performed by one or more, or each of the nodes in the network (where Garg shows all nodes being considered (3.1) which enables creating the most reliable and fully optimized network).

16. Regarding claim 17, Garg in view of Li and Templin further show where the nodes are capable of moving on their own (Li, Section 1).

17. Regarding claims 18, Garg in view of Li further show where the nodes include robotic nodes (Li, Section 1).

18. Regarding claim 19, Garg shows a system for achieving biconnectivity in a network that includes a plurality of nodes comprising means for grouping the subsets of nodes into blocks and means for identifying the cutveritices in the network, and means for, over a number of iterations, removing the cutverticies from the network (3.1-3.1.2, 4.4).

Garg does not show collectively moving the subsets of nodes in or more blocks.

Li shows moving nodes in order to improve network communication, and further where when nodes maintain their neighbors, calculations are simplified (Section 5.1).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the disclosure of Garg with that of Li in order to provide for a method for the semi-autonomous robotic nodes of Li's disclosure to efficiently orient and network themselves in a biconnected network, which, due to the lack of cutvertices,

provides a reliable network configuration (an inherent property of biconnected networks, Mount, pg. 1).

Garg in view of Li do not show where the node movements are done collectively in blocks.

Templin shows where node movement should be minimized, as it results in increased transmissions and can temporarily diminish network performance ([0039]).

It would have been obvious to further modify disclosure of Grag in view of Li with that of Templin, and thus move nodes in collective group block movements, in order to minimize overall node movement and maintain nodes neighbors to the greatest extent possible, thus decreasing transmission costs and improving network performance (Templin [0039]).

19. Regarding claim 21, Garg shows generate a current view of the network (Garg, 3.1.1, 4.4), forming blocks from groups of one or more of the nodes in the network based on the current view of the network (Garg, 3.1, 4.1, 4.4), as well as making a network biconnected (Garg, 3.1, 4.1, 4.4).

Garg does not show in a network that includes a plurality of nodes, at least one of the nodes comprising: a network device that is capable of moving within the network and a movement controller.

Li shows in a network that includes a plurality of nodes, at least one of the nodes comprising: a network device that is capable of moving within the network; and a movement controller (Li, Section 1).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the disclosure of Garg with that of Li in order to provide for a method for the semi-autonomous robotic nodes of Li's disclosure to efficiently orient and network themselves in a biconnected network, which, due to the lack of cutvertices, provides a reliable network configuration (an inherent property of biconnected networks, Mount, pg. 1).

Garg in view of Li do not show where the node movements are done in blocks.

Templin shows where node movement should be minimized, as it results in increased transmissions and can temporarily diminish network performance ([0039]).

It would have been obvious to further modify disclosure of Grag in view of Li with that of Templin, and thus move nodes in group block movements, in order to minimize overall node movement and maintain nodes neighbors to the greatest extent possible, thus decreasing transmission costs and improving network performance (Templin [0039]).

Garg in view of Li and Templin thus show identifying one or more of the blocks, as one or more identified blocks, to move (Li, Sections 1 and 5, Templin [0039]) to make the network biconnected (Garg, 3.1, 4.1, 4.4), as well as the entirety of claim 21 as outlined above.

20. Regarding claim 22, Garg in view of Li and Templin further show where the movement controller is further configured to instruct the network device to move to a particular location when the at least one node is one of the nodes in one of the one or more identified blocks (Li, Sections 1 and 5; Garg 3.1-3.1.2 and 4.4).

21. Regarding claim 23, Garg in view of Li and Templin further show all of the nodes within the one of the one or more identified blocks move collectively (Li, where the leaf blocks are moved collectively to minimize messaging and transmissions costs Templin ([0039]) and to simplify calculations by maintaining nodes neighbors to the greatest extent possible (Li Section 5.1)).

22. Regarding claim 24, Garg in view of Li and Templin further show where the generating a graph includes: determining locations of the nodes in the network, and determining the current view of the topology of the network based on the locations of the nodes in the network (Li, Sections 5, 5.1).

23. Regarding claim 25, Garg in view of Li and Templin further show where the determining locations of the nodes includes: periodically receiving updates from the nodes, each of the updates includes a location of a corresponding one of the nodes. (Li, Sections 5, 5.1).

24. Regarding claim 26, Garg in view of Li and Templin further show where the determining locations of the nodes further includes: extracting neighbor information from the updates (Li, Section 5, where Li discloses that if you directly receive an update from a node, it is a neighbor).

25. Regarding claim 27, Garg in view of Li and Templin further show identifying cutvertices in the network (Garg, 3.1.1).

26. Regarding claim 28, Garg in view of Li and Templin further show where when identifying one or more of the blocks to move, the movement controller is configured to identify a distance and direction to move the one or more identified blocks (Li, Section 1,

where nodes are moved to improve network performance) so as to remove one or more of the cutvertices from the network (Garg, 3.1.1, 3.1.2, 4.4).

27. Regarding claim 30, Garg in view of Li and Templin further show where the movement controller is further configured to determine a distance and direction that the one or more identified blocks should move (Li, Section 1).

28. Regarding claim 31, Garg in view of Li and Templin further show where the one or more of the leaf blocks are moved while minimizing a total distance moved by all of the nodes in the network (where Templin ([0039] shows minimizing node movement along with Li (Section 1)).

29. Regarding claim 32, Garg in view of Li and Templin further show where the moving one or more of the leaf blocks includes: moving each of the one or more of the leaf blocks, as a particular leaf block, towards a nearest node in a parent block (in order to create the biconnected network disclosed by Garg (3.1 – 3.1.2, 4.4) utilizing Templin's ([0039]) and Li's (Section 5.1) disclosures of minimizing node movement and keeping the changes of nodes neighbors minimized).

30. Regarding claim 33, Garg in view of Li and Templin further show where the particular leaf block is moved towards the nearest node until at least one new edge appears between the particular leaf block and the parent block (in order to create the biconnected network by creating/drawing edges disclosed by Garg (3.1 – 3.1.2, 4.4) utilizing Templin's ([0039]) and Li's (Section 5.1) disclosures of minimizing node movement and keeping the changes of nodes neighbors minimized).

31. Regarding claim 34, Garg in view of Li and Templin further show wherein the moving (Li, Section 1, and Templin, [0039]) the one or more identified nodes in the leaf blocks is performed iteratively (Garg, 3.1.1 and 3.1.2) until the network is biconnected (Garg, 1, 3.1.1).

32. Regarding claims 35, Garg in view of Li and Templin further show where the moving of one or more of the leaf blocks is performed after final positions for the one or more of the leaf blocks is determined (where Li discloses that maintaining the network structure simplifies calculations, Section 5.1).

33. Regarding claim 36, Garg in view of Li and Templin further show where the at least one node includes all of the nodes in the network (Garg, 3.1 – 3.1.2).

34. Regarding claim 37, Garg in view of Li further show where the nodes include robotic nodes (Li, Section 1).

35. Claims 8 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Garg in view of Li and Templin as applied to claim 1 above, and further in view of Jennings et al. (Topology Control for Efficient Information Dissemination in Ad-hoc Networks), hereafter Jennings.

Garg in view of Li and Templin show claims 1 and 21.

Garg in view of Li and Templin do not show where the selecting one of the blocks includes, or where the movement controller is configured to identify one of the blocks that includes a maximum number of nodes as the root block.

Jennings shows identifying one of the blocks that includes a maximum number of nodes (Section III).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the disclosure of Garg in view of Li and Templin with that of Jennings in order to minimize node movement (Templin [0039]) which improves performance. As disclosed in claim 1, the leaf blocks rather than the root blocks are moved, and thus the larger the root block, the smaller the leaf blocks, and the less movement occurs.

36. Regarding claim 20, Garg in view of Li and Templin show claim 19.

Garg in view of Li and Templin do not show where where the means for collectively moving includes means for moving the subset of nodes in one of the blocks toward one of the nodes in another one of the blocks.

Liao shows where, when analyzing a network and considering exploiting location information to improve network performance, increasing network density and the corresponding decrease of distance between nodes can result in improved performance (pg. 23).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the disclosure of Garg in view of Li and Templin with a that of Liao in order to, when making the node movements taught by Li, locate the area of the network with the average lowest distance to other nodes, as such short distances, corresponding to node density, can improve performance (Liao pg. 23).

Garg in view of Li, Templin and Liao thus show moving includes means for moving the subset of nodes in one of the blocks toward one of the nodes in another one

of the blocks, as this behavior inherently increases network desnsity and thus improves network performance, as taught by Liao.

37. Claim 39 is rejected under 35 U.S.C. 103(a) as being unpatentable over Garg in view of Li.

38. Regarding claim 38, Garg shows a method for achieving biconnectivity in a network that includes a plurality of nodes (Garg, 1, 3.1-3.2) including generating a graph of the network (Garg, 3.1, 3.1.1) and identifying cutverticies in the network (Garg, 3.1.1, 3.1.2), as well as removing said cutverticies (3.1.1, and further where removing cutverticies to make a network biconnected is inherent, as biconnected networks inherently do not have cutverticies).

Garg does not show causing one or more of the nodes to move systemtically.

Li shows node movement in a network, and directing said node movement in order to improve network performance (Li, Section 1).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the disclosure of Garg with that of Li in order to provide for a method for the semi-autonomous robotic nodes of Li's disclosure to efficiently orient and network themselves in a biconnected network, which, due to the lack of cutvertices, provides a reliable network configuration (an inherent property of biconnected networks, Mount, pg. 1).

39. Claim 39 is rejected under 35 U.S.C. 103(a) as being unpatentable over Garg in view of Li.

Garg shows achieving biconnectivity in a non-biconnected network that includes a plurality of nodes, as well as transforming a non-biconnected network to a biconnected network (Garg, 3.1-3.1.2, 4.1, 4.4).

Garg does not show identifying one or more of the nodes to move (Li, Section 1); determining direction and distance to move the one or more nodes; and moving the one or more nodes in the determined direction and distance.

Li shows identifying one or more of the nodes to move (Li, Section 1); determining direction and distance to move the one or more nodes; and moving the one or more nodes in the determined direction and distance (where Li shows changing a nodes trajectory (Section 1) along with how a node move and where a node moves to (Section 3.2), thus inherently showing 'a determined direction and distance').

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the disclosure of Garg with that of Li in order to provide for a method for the semi-autonomous robotic nodes of Li's disclosure to efficiently orient and network themselves in a biconnected network, which, due to the lack of cutvertices, provides a reliable network configuration (an inherent property of biconnected networks, Mount, pg. 1).

40. Regarding claim 40, Garg in view of Li show the disclosure of claim 39.

Garg in view of Li further show forming blocks from groups of at least one of the nodes in the non-biconnected network, selecting one of the blocks as a root block, and identifying other ones of the blocks as leaf blocks (Garg, 3.1, 4.1, 4.4), as well as showing moving nodes (Li, Section 1).

Garg in view of Li do not show moving the nodes as blocks.

Templin shows where node movement should be minimized, as it results in increased transmissions and can temporarily diminish network performance ([0039]).

It would have been obvious to further modify disclosure of Grag in view of Li with that of Templin, and thus move nodes in group block movements, in order to minimize overall node movement and maintain nodes neighbors to the greatest extent possible, thus decreasing transmission costs and improving network performance (Templin [0039]).

Garg in view of Li and Templin thus show claim 40.

41. Regarding claim 41, Garg in view of Li and Templin further show where the one or more nodes are included in one or more of the leaf blocks (Garg 3.1 – 3.1.2). Regarding claim 42, Garg in view of Li and Templin further show moving the one or more nodes includes: moving the one or more nodes collectively with other ones of the one or more nodes within a same one of the leaf blocks (Li, where the leaf blocks are moved collectively to minimize messaging and transmissions costs Templin ([0039]) and to simplify calculations by maintaining nodes neighbors to the greatest extent possible (Li, Section 5.1)).

42. Claims 43 and 44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Garg in view of Li as applied to claim 39 above, of Liao et al. (GRID: A Fully Location-Aware Routing Protocol for Mobile Ad Hoc Networks), hereafter Liao, and Gibson et al. (US 6,362,821 B1), hereafter Gibson.

43. Regarding claim 43, Garg in view of Li show claim 39.

Garg in view of Li do not show determining the geographic center of the network and determining weighted distances for moving the one or more nodes to toward the geographic center.

Liao shows determining the geographic center of the network (Sections 3.1, pg.8; 3.3, pg. 15, pg. 6).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the disclosure of Garg in view of Li and Templin with a that of Liao in order to locate the area of the network with the average lowest distance to other nodes, as such short distances, corresponding to node density can improve performance (Liao pg. 23).

Garg in view of Li and Liao do not show determining the weighted distances for moving one or more nodes toward said center.

Gibson shows determining said weighted distances (Section 5, lines 1 – 7).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the disclosure of Garg in view of Li and Laio with a that of Gibson in order to provide a route for any node to move to the center of its network, thus allowing for all nodes to move the shortest distances to improve network density and thus performance (Liao, pg. 23).

44. Regarding claim 44, Garg in view of Li, Laio and Gibson further show where the weighted distances (Gibson col. 5 lines 1 – 7) are related to distances that the nodes are from the geographic center (Liao Sections 3.1 pg .8, 3.3 pg. 15, pg 6).

45. Claims 45 is rejected under 35 U.S.C. 103(a) as being unpatentable over Garg in view of Li, Liao and Gibson as applied to claim 43 above, and further in view of Proctor, Jr. et al. (5,960,047), hereafter Proctor.

Garg in view of Li, Liao and Gibson show the method of claim 43.

Garg in view of Li, Liao and Gibson do not show where the direction for a particular node of the one or more nodes includes a straight line joining a starting position of the particular node and the geographic center.

Proctor shows where a straight line is the shortest distance between two points, and thus the most efficient path (col. 3 line 65 – col. 4 line 5).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the disclosure of Garg in view of Li, Liao and Gibson with that of Proctor in order for the nodes to take the fastest and most efficient path when moving.

46. Claim 46 is rejected under 35 U.S.C. 103(a) as being unpatentable over Garg in view of Li, further in view of Liao and Gibson.

Regarding claim 46, Garg shows a method for achieving biconnectivity in a non-biconnected network that includes a plurality of nodes (Garg 3.1, 3.2, 4.4).

Garg does not not show determining a geographic center of the non-biconnnected network and moving each one of one or more nodes a weighted distance towards the geographic center to transform the non-biconnected network to a biconnected network.

Li shows node movement in a network, and directing said node movement in order to improve network performance (Li, Section 1).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the disclosure of Garg with that of Li in order to provide for a method for the semi-autonomous robotic nodes of Li's disclosure to efficiently orient and network themselves in a biconnected network, which, due to the lack of cutvertices, provides a reliable network configuration (an inherent property of biconnected networks, Mount, pg. 1).

Garg in view of Li do not show determining a geographic center of the non-biconnnected network, and though they do show node movement and transforming to a biconnected network, they do not show moving a weighted distance towards the geographic center to transform the non-biconnected network to a biconnected network.

Liao shows a method of determining the geographic center of a network (Liao 2.4, 3.1-3.2).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the disclosure of Garg in view of Li with a that of Liao in order to locate the area of the network with the average lowest distance to other nodes, as such short distances, corresponding to node density, can improve performance (Liao pg. 23).

Garg in view of Li and Liao do show transformation to a biconnected network (Garg 3.1, 3.2, 4.4), node movement to improve network performance (Li, Section 1) determining a geographic center of a network along with moving nodes to said geographic center corresponding to improved performance (Liao, 2.4, 3.1-3.2), but not where said movement is done according to a weighted distance.

Gibson shows determining said weighted distances (Section 5, lines 1 – 7).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the disclosure of Garg in view of Li and Laio with a that of Gibson in order to provide a route for any node to move to the center of its network, thus allowing for all nodes to move the shortest distances to improve network density and thus performance (Liao, pg. 23).

47. Claim 47 is rejected under 35 U.S.C. 103(a) as being unpatentable over Garg in view of Li, further in view of Liao and Gibson.

Regarding claim 47, Garg show a network that includes a plurality of nodes, at least one of the nodes comprising a network device as well as determining the locations of the odes and achieving biconnectivity in the network (Garg 3.1, 3.2, 4.4).

Garg does not show a node movement or a movement controller.

Li show a movement controller including node movement in a network, and directing said node movement in order to improve network performance (Li, Section 1).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the disclosure of Garg with that of Li in order to provide for a method for the semi-autonomous robotic nodes of Li's disclosure to efficiently orient and network themselves in a biconnected network, which, due to the lack of cutvertices, provides a reliable network configuration (an inherent property of biconnected networks, Mount, pg. 1).

Garg in view of Li do not show identifying a geographic center of the network based on the locations of the nodes.

Liao shows determining the geographic center of the network based on the locations of the nodes (Sections 3.1, pg.8; 3.3, pg. 15, pg. 6).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the disclosure of Garg in view of Li with a that of Liao in order to locate the area of the network with the average lowest distance to other nodes, as such short distances, corresponding to node density, can improve performance (Liao pg. 23).

Garg in view of Li and Liao do show transformation to a biconnected network (Garg 3.1, 3.2, 4.4), node movement to improve network performance (Li, Section 1) determining a geographic center of a network along with moving nodes to said geographic center corresponding to improved performance (Liao, 2.4, 3.1-3.2), but not where said movement is done according to a weighted distance.

Gibson shows determining said weighted distances (Section 5, lines 1 – 7).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the disclosure of Garg in view of Li and Laio with a that of Gibson in order to provide a route for any node to move to the center of its network, thus allowing for all nodes to move the shortest distances to improve network density and thus performance (Liao, pg. 23).

48. Claim 48 is rejected under 35 U.S.C. 103(a) as being unpatentable over Garg in view of Li, further in view of Liao.

Regarding claim 48, Garg shows a system for achieving biconnectivity in a non-biconnected network that includes a plurality of nodes, including transforming a non-biconnected network into a biconnected network (Garg 3.1, 3.2, 4.4).

Garg does not show means for causing each of one or more of the nodes to move.

Li shows means for causing each of one or more of the nodes to move, and directing said node movement in order to improve network performance (Li, Section 1).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the disclosure of Garg with that of Li in order to provide for a method for the semi-autonomous robotic nodes of Li's disclosure to efficiently orient and network themselves in a biconnected network, which, due to the lack of cutvertices, provides a reliable network configuration (an inherent property of biconnected networks, Mount, pg. 1).

Garg in view of Li do not show identifying a geographic center of the network based on the locations of the nodes.

Liao shows determining the geographic center of the network based on the locations of the nodes (Sections 3.1, pg.8; 3.3, pg. 15, pg. 6).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the disclosure of Garg in view of Li with a that of Liao in order to locate the area of the network with the average lowest distance to other nodes, as such short distances, corresponding to node density, can improve performance (Liao pg. 23).

49. Claim 49 is rejected under 35 U.S.C. 103(a) as being unpatentable over Garg in view of Li.

Regarding claim 49, Garg shows achieving biconnectivity in a network that includes a plurality of nodes, determining the current topology of the network (3.1),

instructions for indentifying cutverticies in the network based on the current topology of the network (3.1.1) and systematically removing cutverticies from the network and forming a biconnecting network (Garg, Section 1, 3.1.1 and 3.1.2, where Mount on pg. 1 shows where a lack of cutverticies are inherent to a biconnected network).

Garg does not show instructions for identifying one or more of the nodes in the network to move.

Li shows means for causing each of one or more of the nodes to move, and directing said node movement in order to improve network performance (Li, Section 1). Furthermore, Li shows controlling node movement and trajectory, which inherently includes causing and controlling movement in a particular direction (Section 1).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the disclosure of Garg with that of Li in order to provide for a method for the semi-autonomous robotic nodes of Li's disclosure to efficiently orient and network themselves in a biconnected network, which, due to the lack of cutvertices, provides a reliable network configuration (an inherent property of biconnected networks, Mount, pg. 1).

Garg in view of Li thus show claim 49.

50. Claims 50 – 52 and 54 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hsu (Simpler and faster biconnectivity augmentation) in view of Li.

51. Regarding claim 50, Hsu shows a method for achieving biconnectivity in a one-dimensional non-biconnected network that includes a plurality of nodes, comprising: determining initial positions of the nodes in the one-dimensional non-biconnected

network (Abstract, Section 1) as well as determining this with linear programming (Sections 1 and 3).

Hsu does not show determining a movement schedule and causing one or more of the nodes to move based on the determined movement schedule.

Li shows determining a movement schedule and causing one or more of the nodes to move based on the determined movement schedule (Section 1).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the disclosure of Hsu with that of Li in order to provide for a method for the semi-autonomous robotic nodes of Li's disclosure to efficiently orient and network themselves in a biconnected network, which, due to the lack of cutvertices, provides a reliable network configuration (an inherent property of biconnected networks Mount, pg. 1).

52. Regarding claim 51, Hsu in view of Li further show determining the movement schedule as an objective function, converting the objective function into a linear programming representation, and solving the linear programming representation optimally in polynomial time (Hsu, Abstract, Sections 1 and 3).

53. Regarding claim 52, Hsu in view of Li further show where the linear programming representation is solved as a function of a number of nodes in the one-dimensional non-biconnected network (Hsu Section 3).

54. Regarding claim 54, Hsu in view of Li further show a system for achieving biconnectivity in a one-dimensional non-biconnected network that includes a plurality of nodes, comprising: means for determining initial positions of the nodes in the one-

dimensional non-biconnected network (Hsu, Abstract, Sections 1 and 3); means for determining a movement schedule optimally in polynomial time based at least in part on the initial positions of the nodes and a number of the nodes in the one-dimensional non-biconnected network (Hsu, Abstract, Sections 1 and 3, where Hsu discloses a solution in linear time, which is inherently faster than polynomial time and thus is inclusive of any polynomial time solutions, and Li, Section 1); and means for causing one or more of the nodes to move based on the determined movement schedule to achieve biconnectivity in the one-dimensional non-biconnected network (Li, Section 1, and Hsu, Sections 1 – 3).

55. Claims 53 and 55 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hsu in view of Li as applied to claims 50 and 54 above, and further in view of Lin et al. (Adaptive Clustering for Mobile Wireless Networks), hereafter Lin.

56. Regarding claim 53, Hsu in view of Li show the method of claim 50.

Hsu in view of Li do not show where each of the nodes in the biconnected network is capable of communicating with other ones of the nodes in the biconnected network one and two hops away.

Lin shows where each of the nodes in the biconnected network is capable of communicating with other ones of the nodes in the biconnected network one and two hops away (Sections 1, 2(A)).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the disclosure of Hsu in view of Li with that of Lin in order to provide

for the most reliable and efficient network that allows all nodes to properly communicate.

57. Regarding claim 55, Hsu in view of Li and Lin show each of the nodes is capable of communicating with other ones of the nodes one and two hops away after biconnectivity is achieved in the one-dimensional non-biconnected network (Hsu, Sections 1-3, Lin Sections 1 and 2(A)).

Response to Arguments

1. Applicant's arguments with respect to claims 1 – 20, 38 and 49 have been considered but are moot in view of the new ground(s) of rejection.

2. Regarding claim 21, rejected under 35 USC 103; Garg in view of Li and Templin Applicant begins by substantially repeating claim 21 and then alleging that Garg does not show those features. However, as was clearly stated in the previous action, Garg was not used to show all of those features. For example, Applicant alleges that Garg does not show a movement controller. The rejection made of claim 21 does not look to Garg for teaching a movement controller, but rather to Li. Li indeed clearly shows a movement controller in the previously cited section 1, stating that the disclosure involves' asking intermediate hosts to change their trajectory' and 'Instead of statically waiting for network reconnection, a host can change its trajectory based on the knowledge about other hosts trying to achieve the network connection actively' and 'In this paper, we explore the possibility of changing the trajectories of the hosts in a dynamic disconnected ad-hoc network to transmit messages among hosts.' This clearly

shows changing the trajectories of moving nodes, teaching the claimed 'movement controller'.

3. Garg is cited to teach 'generating a current view of nodes in the network' as well as 'form blocks from groups of one or more of the nodes in the network based on the current view of the network.' Garg clearly does this in the previously cited sections 3.1.1, 4.1 and 4.4. For example, in 3.1.1., Fig. 1, Garg shows a view of the network that has been generated, as well as teaching 'partitioning ... into blocks' based on the generated view of the network (where said view is generated, in one embodiment, by a DFS (depth-first search). Thus, Garg clearly teaches what the reference was cited to teach. Claiming that Garg, Li or Templin do not teach or show items or ideas which they were not cited to teach is not persuasive.

4. Still regarding claim 21, Applicant argues that Li does not show a movement controller. However, as was outlined in the preceding paragraphs, Li clearly does show a movement controller, thus said argument is not persuasive.

5. Applicant continues by arguing the Templin reference. However, Templin was not cited to teach 'a movement controller, within at least one of a plurality of nodes in a network, that is configured to identify one or more blocks, as one or more identified blocks, to move to make a network biconnected'. Templin shows the desirability of node movement being minimized, as it results in increased transmissions and can temporarily diminish network performance [0039].

The 'identifying one or more blocks, as one or more identified blocks, to move to make the network biconnected' is show by Garg in view of Li and Templin. As was

stated in the original office action, Garg shows ‘identifying one or more blocks, as one or more identified blocks’ (3.1.1., Fig. 1, Garg shows a view of the network that has been generated, as well as teaching ‘partitioning … into blocks’ based on the generated view of the network (where said view is generated, in one embodiment, by a DFS (depth-first search).

Li shows moving nodes in an ad-hoc (MANET) environment in order to improve network communication, where the nodes are autonomous or semi-autonomous robotic nodes (Sections 1, 5), and further where when nodes maintain their neighbors, calculations are simplified (Section 5.1).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the disclosure of Garg with that of Li in order to provide for a method for the semi-autonomous robotic nodes of Li’s disclosure to efficiently orient and network themselves in a biconnected network, which, due to the lack of cutvertices, provides a reliable network configuration (an inherent property of biconnected networks, Mount, pg. 1).

Garg in view of Li do not show where the node movements are done in blocks.

As was discussed above, Templin shows where node movement should be minimized, as it results in increased transmissions and can temporarily diminish network performance ([0039]).

It would have been obvious to further modify disclosure of Grag in view of Li with that of Templin, and thus move nodes in group block movements, in order to minimize overall node movement and maintain nodes neighbors to the greatest extent possible,

thus decreasing transmission costs and improving network performance (Templin [0039]).

Thus, as has been shown above, Garg in view of Li and Templin do indeed show the entirety of claim 21, and thus Applicant's arguments are not persuasive.

6. Applicant continues by arguing that claims 22-28, 30-33, 35-37 should also be allowed for the same reasons as claim 21. However, given that claim 21 is not allowable, this argument is not persuasive.

7. Regarding claims 39 - 49, Applicant's arguments are moot in view of the new grounds of rejection.

8. Regarding claim 50, rejected under 35 USC 103, Hsu in view of Li, Applicant again argues that this two-reference rejection is 'piecemeal'. Applicant's argument is not persuasive.

9. Applicant further argues that 'Hsu in view of Li do not disclose or suggest determining a movement schedule for the nodes using one or more linear programming techniques.'

However, as was shown in the previous action, Hsu clearly shows utilizing linear programming techniques in a networking environment (Abstract and Sections 1 and 3), and Li clearly shows determining a movement schedule (Section 1), as well as the rest of claim 50. Given the previously provided reason to combine, Applicant's arguments are not persuasive.

10. Applicant argues that claims 51 – 52 should be allowable for the same reasons as claim 50. However, given the lack of a persuasive argument to allow claim 50, and

the previous reasons for rejection provided for claims 51 and 52, claims 51 and 52 are similarly not allowable.

11. Regarding claim 54, Applicant continues by arguing that Hsu does not show determining a movement schedule. However, Hsu was not cited to show a movement schedule, Li was, as was addressed above regarding claim 50. Furthermore, regarding the issue of polynomial time, which was addressed in the previous action, Hsu discloses a solution in linear time, which is inherently faster than polynomial time and thus is inclusive of any polynomial time solutions, and Li, Section 1. Regarding the reasons for combination, the same grounds of rejection are utilized in the present action as were utilized in the previous action, however, said reasons for combination and utilization of said references are made more explicitly in the present action.

12. Regarding claims 53 and 55, Applicant argues that they are allowable for the reason that the claims on which they depend (claims 50 and 54) are allowable. However, given the lack of persuasive arguments for allowing claims 50 and 54, claims 53 and 55 remain rejected.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to John M. Frink whose telephone number is (571) 272-9686. The examiner can normally be reached on M-F 7:30AM - 5:00PM EST; off alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Andrew Caldwell can be reached on (571)272-3868. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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